#506

HELIOS-1
74-097A-03A

HELIOS-2
76-003A-03A

8-SEC. AVG. SPECT. DEN.

8 CHAN 6.8-1470

HELIOS-A

8-S AVG SPECT DEN 8 CHAN 6.8-1470

74-097A-03A

This data set has been restored. There were originally nine 9-track, 1600 BPI tapes written in Binary. There are three restored tapes. The DR tapes are 3480 cartridges and the DS tapes are 9-track, 6250 BPI. The original tapes were created on an IBM 360 computer and the restored tapes were created on an IBM 9021 computer. The DR and DS numbers along with the corresponding D numbers are as follows:

DR#	DS#	D#	FILES	TIME SPAN
DR004591	DS004591	D045032	1	12/10/74 - 12/24/74
		D045033	2	12/23/74 - 01/03/75
		D045034	3	01/03/75 - 01/15/75
DR004592	DS004592	D045035	1	01/15/75 - 01/28/75
		D045036	2	01/27/75 - 02/13/75
		D045037	3	02/13/75 - 02/28/75
DR004593	DS004593	D045038	1	02/25/75 - 03/15/75
		D045039	2	03/15/75 - 07/19/75
		D045040	3	07/19/75 - 09/20/75

HELIOS-B

8-S AVG SPT DEN 8 CHAN 6.8-1470HZ

76-003A-03A

This data set has been restored. There were originally nine 9-track, 1600 BPI tapes written in Binary. There are three restored tapes. The DR tapes are 3480 cartridges and the DS tapes are 9-track, 6250 BPI. The original tapes were created on a PDP11 computer and the restored tapes were created on an IBM 9021 computer. The DR and DS numbers along with the corresponding D numbers are as follows:

DR#	DS#	D#	FILES	TIME SPAN
DR004549	DS004549	D045483	1	01/15/76 - 01/27/76
		D045484	2	01/27/76 - 02/08/76
		D045485	3	02/08/76 - 02/20/76
DR004550	DS004550	D045486	1	02/20/76 - 03/02/76 (a)
		D045487	2	03/02/76 - 03/14/76
		D045488	3	03/14/76 - 03/28/76
DR004551	DS004551	D045489	1	03/28/76 - 04/12/76
		D045490	2	04/12/76 - 04/26/76
		D045491	3	04/26/76 - 11/21/76

(a) D045486: Read errors occurred in records 12727 & 12728 of file 1.

REQ. AGENT	RAND NO.	ACQ. AGENT
GLS	V0098	HKH

HELIOS 1

Data sheets say PDP

8-SEC AVG SPECT DEN 8 CHAN 6.8-1470

74-097A-03A

This data set catalog contains 9 magnetic tapes. They are are 9 track, 1600 BPI, BINARY and each tape has one file. The first record in a tape is a header-record. The next record is a day label. Additional day labels precede every change of day on a tape. The other records are science data records. The following list contains D numbers, C numbers and time spans of each tape.

D#	C#	TIME SPAN
D-45032	C-21766	12/10/74 - 12/24/74
D-45033	C-21767	12/23/74 - 01/03/75
D-45034	C-21768	01/03/75 - 01/15/74
D-45035	C-21769	01/15/75 - 01/28/75
D-45036	C-21770	01/27/75 - 02/13/75
D-45037	C-21771	02/13/75 - 02/28/79
D-45038	C-21772	02/25/75 - 03/15/75
D-45039	C-21773	03/15/75 - 07/19/75
D-45040	C-21774	07/19/75 - 09/20/75

REQ. AGENT	RAND #	ACQ. AGENT
GLS	V0098	HKH
DAD	V0210	RWP

Dec

HELIOS-2

8-β AVG. SPECT DENSITY 8 6.8-1470 DATA

76-003A-03A

This data set catalog contains 9 magnetic tapes. They are 9 track, 1600 BPI, BINARY and each tape has one file. The first record in a tape is a header-record. The next record is a day label. Additional day labels precede every change of day on a tape. The other records are science data records. The following list contains D and C numbers and time spans of each tape.

D#	C#	TIME SPAN
D-45483	C-23392	01/15/76 - 01/27/76
D-45484	C-23393	01/27/76 - 02/08/76
D-45485	C-23394	02/08/76 - 02/20/76
D-45486	C-23395	02/20/76 - 03/02/76
D-45487	C-23396	03/02/76 - 03/14/76
D-45488	C-23397	03/14/76 - 03/28/76
D-45489	C-23398	03/28/76 - 04/12/76
D-45490	C-23399	04/12/76 - 04/26/76
D-45491	C-23400	04/26/76 - 11/21/76

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Description of Average Tapes of Experiment-4 Data of He-1 and -2 (Search-Coil Magnetometer Experiment)

A) Structure of Tapes

1) 9 track, 1600 BPI, binary
2) Files: one tape includes one file
3) Records: they have variable length. The maximal length is 800 words. The first record in a tape is a header-record. The next record is a day label. Additional day labels precede every change of day in a tape. The other records are science data records. In average tapes two types of science data records are possible:

   Mean value records (Mean)
   peak value records (Max)

   The time sequence is as follows:

   Mean (T1), Max (T1), Mean (T1 + 0.5 × Tstep),
   Mean (T1 + 2 × Tstep), Max (T1 + 2 × Tstep),
   Mean (T1 + 1.5 × Tstep),
   a.s.o.
   with: T1 - any start time
   Tstep - time intervall for one Max

4) words:
   The wordlength is 16 bits.
   The content of records is counted in words.
   For detailed description of words in a record see 'E4 adr Tape Records' (enc.)

   character representation : 8-bit Ascii code
   bits 1-8 first character
   bits 9-16 second character

integer representation: 1 word, two's complement
real representation: 2 words
bit 1: sign
bits 2-10: exponent (biased+256)
bits 11-32: positive fraction
long representation: 4 words
bits 1-10: same as real
bits 11-64: positive fraction

B) Science Data Records:

1) Data processing: For detailed description of the search-coil magnetometer experiment (E4) see Neubauer et al. (1977), Dehmel et al. (1975).

The experiment consists of 3 orthogonal search-coil sensors with Z-axis parallel to the spin-axis and the X- and Y-axis in the equatorial plane.
The Z-component and one of the X- or Y-component is processed by a spectrum analyser. It consists of 8 band-pass filters spaced logarithmically in frequency.

frequency range [Hz]	center freq. [Hz]	channels
4.7 - 10	6.8	X1, Z1
10 - 22	14.7	X2, Z2
22 - 47	31.6	X3, Z3
47 - 100	68	X4, Z4
100 - 220	147	X5, Z5
220 - 470	316	X6, Z6
470 - 1000	681	X7, Z7
1000 - 2200	1470	X8, Z8
		(or instead of X : Y)

A set of X1, Z1, ... , X8, Z8 is called a vector.

Mean vaules:

The filter outputs are squared and averaged by a digital mean-value-computer on board of Helios. The time intervalls are:

1.125, 2.25, 4.5, 18, 36, 72, 144, 288, 576, 1152 seconds depending on the operational mode of the S/C telemetry system.

Peak values:

For the same time interval the peak reading from each filter output is transmitted in addition to the mean values. The peak values are scaled such that for a monochromatic signal they are above the mean values by a factor of $\sqrt{2}$. No peak values exist for distribution mode 0.

8sec average tapes:

The data records consist of experimental output voltages with respect to an amplification factor. For average intervals less than 4.5 seconds the mean values are compressed to 8-sec-averages.

2) Time information:

The number of days is counted from the day of year at launch.

He 1: launched December 10, 1974
number of day: 344

He 2: launched January 15, 1976
number of day: 15

Attention: No reset of day number was made when the year changes.

The fraction of day is the current time of that day.

e.g.: He-1, February 1, 1975 at 12.00
number of days: 397
fraction of days: 0.5

The number and fraction of day provide the event time of the first vector in a data record. The vector step time is the time between two vectors in fraction of day.

3) Conversion of data:

To convert the sensor output voltages into spectral densities measured in $\gamma/\sqrt{Hz}$ (= nT · $\sqrt{sec}$) one has to apply a conversion factor conv(f) and the amplification factor Amp to each channel.
Amp is 10. throughout the missions of He1 and 2.

conv(f)	channel X,Y,Z
$2.07 \cdot 10^{-6}$	8
$6.58 \cdot 10^{-6}$	7
$2.11 \cdot 10^{-5}$	6
$6.65 \cdot 10^{-5}$	5
$2.11 \cdot 10^{-4}$	4
$6.60 \cdot 10^{-4}$	3
$2.09 \cdot 10^{-3}$	2
$6.59 \cdot 10^{-3}$	1

e.g.: Value of sensor 2, 1st vector, channel 8
value [$\gamma/\sqrt{Hz}$] = real (word 87,88) × conv(8)/Amp

4) Noise:

There are some rare cases showing only background noise in all frequency channels. But in most of the time channel 1 and 2 (frequency 4.7 - 22 Hz) show signals well above the noise levels.
The occurence of signals above the noise decrease with increasing frequency and increase with approach to the sun.

Lit.: Neubauer, F.M., Beinroth, H.J., Barnstorf, H., Dehmel, G.: Initial results from the Helios-1 search-coil magnetometer experiment. J.Geophys.Res., 42, 599-614, 1977.

Dehmel, G., Neubauer, F.M., Lukoschus, D., Wawretzko, J., Lammers, E.: Das Induktionsspulen-Magnetometer-Experiment (E4). Raumfahrtforschung, 19, 241-244, 1975.

****

E4ADR TAPE RECORDS FILE: "E4FORMAT.GBEIN"
05.03.81

****

1. TAPE HEADER

WORDNUMBER	TYPE	CONTENT	
1	INTEGER	100	LABEL
2	INTEGER		LENGTH OF RECORD IN WORDS
3	CHARACTER		"**** E4ADR TAPE HEADER/HELIOS A ****" "**** E4ADR TAPE HEADER/HELIOS B ****"
21	INTEGER		NUMBER OF TAPE
22	INTEGER		NUMBER OF SERIES
23	INTEGER		YEAR OF GENERATION
24	INTEGER		MONTH "
25	INTEGER		DAY "
26	INTEGER		HOUR "
27	INTEGER		MINUTE "
28	INTEGER		MAX. LENGTH OF DATA RECORD IN WORDS
29	INTEGER		OUTPUT DEVICE
30	INTEGER		BPI
31	INTEGER		AVERAGE TIME OF TAPE IN SECONDS
32-60			FREE

2. DAY LABEL

1	INTEGER	99	LABEL
2	INTEGER	12 -	LENGTH OF RECORD IN WORDS
3	INTEGER		NUMBER OF DAYS SINCE LAUNCH
4	CHARACTER		"****DAY LABEL*****"

3. SCIENCE DATA

1	INTEGER	11 -	MEANVALUES
		12 -	MAXIMALVALUES
		13 -	WAVEFORMVALUES
2	INTEGER		LENGTH OF RECORDS IN WORDS
3	INTEGER		NUMBER OF DAYS SINCE LAUNCH
4-7	LONG		FRACTION OF DAY (DECIMAL)
8-9			FREE
10	INTEGER		NUMBER OF VECTORS IN RECORD
11			FREE
12	INTEGER		FORMAT
13	INTEGER		BIT RATE
14	INTEGER		DISTRIBUTION MODE
15-18	LONG		VECTOR STEP TIME IN FRACTION OF DAY
19-21			FREE

58	22	INTEGER	90 - HELIOS 1
59			91 - HELIOS 2
60	23-24	REAL	ECLIPT. LAT. OF SPIN AXIS (RAD)
61	25,26	REAL	ECLIPT. LONG. OF SPIN AXIS (RAD)
62	27,28		FREE
63	29-30	REAL	ECLIPT. LONG. OF HELIOS POS.(RAD)
64	31-32	REAL	DISTANCE FROM SUN (AJ)
65	33-34	REAL	FREE
66	35,36		HELIOGRAPH. LAT. OF HEL. POS.(RAD)
67	37,38	REAL	ANGLE HELIOS-SUN-EARTH (RAD)
68	39,40		FREE
69	41,42	REAL	SAMPLING RATE IN ORIG. DATA
70			(ONLY AVERAGE TAPES)
71	43-46	LONG	VECTOR STEP TIME " "
72			(ONLY AVERAGE TAPES)
73	47-66		FREE
74	67-70	LONG	TRIP LIGHT TIME IN FRACTION OF DAY
75	71-74	LONG	SPIN PERIOD IN FRACTION OF DAY
76	74-80		FREE
77			
78			
79		DATA PART OF REC	
80			
81	81	INTEGER	0 - GOOD QUALITY
82			1-7- BAD QUALITY
83	82	INTEGER	0 - Y - SENSOR
84			1 - X - SENSOR
85	83	INTEGER	AMPLIFICATION FACTOR
86			(0 - .4, 1 - .08
87			2 - 10., 3 - 2.)
88	84	INTEGER	FACTOR, ONLY IN AVERAGE TAPES
89	85-86	REAL	SAMPLING RATE (IN AVERAGE TAPES
90			NUMBER OF GOOD VECTORS FOUND
91			IN THIS AVERAGE INTERVALL,
92			SEE WORD 41,42)
93	87-118	REAL	16 WORDS, 8X,8Z,7X,7Z,...,1X,1Z
94			FOR MEAN VALUES
95	87-102	INTEGER	16 WORDS, 8X,8Z,7X,7Z,...,1X,1Z
96			FOR MAXIMAL VALUES
97			
98		REPETITIONS FOR N MORE VECTORS AS SPECIFIED IN WORD 10	
99			
100	**********		

```
  100      ****************************************************************************

LINES = 60
POLL = TRUE  (I.E. BATCH = FALSE)
REAR = TRUE (I.E. FRONT = FALSE)
DELTA =       1
CURRENT DEPTH = 0, THE DEPTH LIMIT = 10
RIGHT =72
LENGTH = 72
LONG = TRUE (I.E. SHORT = FALSE)
TIME = 50
TOTAL NUMBER OF CURRENT LINES = 100
FROM =      1
LEFT =  1
FIXED = TRUE (I.E. VARIABLE = FALSE)
SIZE = 0
DISPLAY = TRUE (I.E. QUIET = FALSE)
FORMAT=DEFAULT
NO TABS USED
FILES:
    WORK: K0641640
    KEEP:
    TEXT: E4FORMAT.GBEIN.E4          THU, MAR  5, 1981,  4:40 PM
    JOIN:
```

74-097A-03A

(1)

RECORD 1 OF FILE 1
LENGTH = 120 BYTES

0064003C	2A2A2A2A	20453441	44522054	41504520	48454144	45522F48	454C494F	53204120	2A2A2A2A
00010001	07BB0007	0002000A	002F0264	000C0640	00080000	00000000	00000000	00000000	00000000
00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000

12/10/74 – 12/24/74

RECORD 2 OF FILE 1
LENGTH = 24 BYTES

DAY 344

0063000C 0158 2A2A 2A2A4441 59204C41 42454C2A 2A2A2A2A

DUMP OF TAPE GOUTA

D-45032
12/10/74 - 12/24/74

INPUT TAPE GOUTA ON MT4
DATA INPUT H9 FL 1 2 STOP

FILE 1 RECORD 1 LENGTH 120BYTES

(0)	0064003C	2A2A2A2A	20453441	44522054	41504520	48454144	45522F48	454C494F	53204120	2A2A2A2A
(40)	00010001	07BB0007	0002000A	002F0264	000C0640	00080000	00000000	00000000	00000000	00000000
(80)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000

DAY

FILE 1 RECORD 344 2 LENGTH 24BYTES

(0)	0063000C	0158 2A2A	2A2A4441	59204C41	42454C2A	2A2A2A2A

EOJ STOP REQUESTED IN FILE 1

EOJ DUMP STOPPED AFTER FILE 1 # OF PERMANENT READ ERRORS 0

START TIME 10/22/81 20:54:04 STOP TIME 10/22/81 20:54:31

[redacted]

FORM 14113

$$

DUMP OF TAPE GOUTI

07/19/75 - 09/20/75

D-45040

```
INPUT TAPE  GOUTI   ON  MT4
DATA INPUT    H9 FL 1 2 STOP

 FILE       1  RECORD        1  LENGTH     120BYTES
 (      0)   0064003C  2A2A2A2A  20453441  44522054  41504520  48454144  45522F48  454C494F  53204120  2A2A2A2A
 (     40)   07BD0007  07BB0007  0005000A  000A0264  10680640  00080000  00000000  00000000  00000000  00000000
 (     80)   00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000
                       DAY
 FILE       1  RECORD      565  2  LENGTH      24BYTES
 (      0)   0063000C  0235 2A2A  2A2A4441  59204C41  42454C2A  2A2A2A2A

EOJ     STOP REQUESTED IN FILE    1

EOJ          DUMP STOPPED AFTER FILE   1          # OF PERMANENT READ ERRORS   0

START TIME 10/24/81  10:25:15          STOP TIME 10/24/81  10:25:32
```

FORM 14113

```
$$
$ASS IN MT5 OUT MT6
$EXE TPDUPC BS
```